LIST OF CURRENT CLAIMS

1. (Currently Amended) A regulating device comprising a balance ~~(1)~~ and a plane hairspring ~~(2)~~ for a time piece movement, the plane hairspring ~~(2)~~ including in its outer turn ~~(7)~~ a stiffened portion ~~(8)~~ arranged to cause the deformations of the turns to be substantially concentric, ~~characterized in that~~ wherein the spacing ~~(d)~~ between a terminal portion of the outer turn ~~(7)~~ and the last-but-one turn ~~(9)~~ of the hairspring ~~(2)~~ is large enough for said last-but-one turn ~~(9)~~ to remain free radially during expansions of the hairspring ~~(2)~~ up to amplitudes corresponding substantially to the maximum angle of rotation of ~~the~~ a balance ~~(1)~~ in said movement.

2. (Currently Amended) The [[A]] regulating device according to claim 1, ~~characterized in that~~ wherein the maximum angle of rotation of the balance ~~(1)~~ in said movement is slightly less than the knocking angle.

3. (Currently Amended) The [[A]] regulating device according to claim 1, wherein ~~or claim 2, characterized in that~~ the maximum angle of rotation of the balance ~~(1)~~ in said movement is substantially equal to 330°.

4. (Currently Amended) The [[A]] regulating device according to claim 1, wherein ~~any one of claims 1 to 3, characterized in that~~ the spacing ~~(d)~~ between the terminal portion of the outer turn ~~(7)~~ and the last-but-one turn ~~(9)~~ of the hairspring ~~(2)~~ is large enough for said last-but-one turn ~~(9)~~ to remain free radially during expansions of the hairspring ~~(2)~~ up to amplitudes corresponding substantially to the knocking angle of the balance ~~(1)~~ in said movement.

5. (Currently Amended) The [[A]] regulating device according to claim 1, wherein ~~any one of claims 1 to 4, characterized in that~~ the stiffened portion ~~(8)~~ is a portion of strip of

thickness ~~(e)~~ in the plane of the hairspring ~~(2)~~ greater than the thickness ~~(e_0)~~ of the remainder of the strip forming the hairspring ~~(2)~~.

6. (Currently Amended) The [[A]] regulating device according to claim 5, wherein ~~characterized in that~~ the thickness ~~(e)~~ in the plane of the hairspring ~~(2)~~ of the stiffened portion ~~(8)~~ varies over the entire length of the stiffened portion ~~(8)~~ as a convex and continuous function and presents a minimum substantially equal to the thickness ~~(e_0)~~ of the remainder of the strip at the two ends of the stiffened portion ~~(8)~~ and a maximum that is greater than the thickness ~~(e_0)~~ of the remainder of the strip between said two ends.

7. (Currently Amended) The [[A]] regulating device according to claim 5, wherein ~~characterized in that~~ the thickness ~~(e)~~ in the plane of the hairspring of the stiffened portion ~~(8")~~ is substantially constant over the entire length of said stiffened portion ~~(8")~~.

8. (Currently Amended) The [[A]] regulating device according to claim 5, wherein ~~characterized in that~~ the thickness ~~(e)~~ in the plane of the hairspring ~~(2)~~ of the stiffened portion ~~(8"')~~ is substantially constant over the entire length of said stiffened portion ~~(8"')~~ except in terminal portions ~~(13)~~ where, respectively, the thickness ~~(e)~~ decreases continuously towards the ends ~~(14)~~ of said stiffened portion ~~(8"')~~.

9. (Currently Amended) The [[A]] regulating device according to claim 5, wherein ~~any one of claims 5 to 8, characterized in that~~ the extra thickness defined by the stiffened portion ~~(8)~~ relative to the remainder of the strip is situated exclusively on the outer side of the outer turn ~~(7)~~.

10. (Currently Amended) The [[A]] regulating device according to claim 5, wherein ~~any one of claims 5 to 9, characterized in that~~ the height of the hairspring is substantially constant over the entire length of said hairspring.

11. (Currently Amended) A time piece movement including a regulating device according to claim 1 ~~any one of claims 1 to 10~~.

12. (Original) A time piece, such as a watch, including a movement according to claim 11.

13. (Currently Amended) A method of designing a regulating device having a balance ~~(1)~~ and a plane hairspring ~~(2)~~ for a time piece movement, in which method a stiffened portion ~~(8)~~ is provided in the outer turn ~~(7)~~ of the plane hairspring ~~(2)~~ so as to cause the deformations of the turns to be substantially concentric, the method comprising providing ~~being characterized in that~~ a spacing ~~(d) is also provided~~ between a terminal portion of the outer turn ~~(7)~~ and the last-but-one turn ~~(9)~~ of the hairspring ~~(2)~~, said spacing ~~(d)~~ being large enough for said last-but-one turn ~~(9)~~ to remain free radially during expansions of the hairspring ~~(2)~~ up to amplitudes corresponding substantially to the maximum angle of rotation of ~~the~~ a balance ~~(1)~~ in said movement.

14. (Currently Amended) The [[A]] method according to claim 13, wherein ~~characterized in that~~ in order to design the plane hairspring ~~(2)~~ with the stiffened portion ~~(8")~~, the following steps are performed:

· defining a plane hairspring of constant strip thickness;

· determining the unbalance of said plane hairspring;

· determining a portion of the outer turn of said plane hairspring having the same unbalance as the plane hairspring; and

· stiffening said outer turn portion.

15. (Currently Amended) The [[A]] method according to claim 14, wherein ~~characterized in that~~ the step of stiffening the outer turn portion ~~consists in~~ comprises increasing its thickness ~~(e)~~ in the plane of the hairspring ~~(2)~~.

16. (Currently Amended) The [[A]] method according to claim 13, wherein ~~characterized in that~~ in order to design the plane hairspring ~~(2)~~ with the stiffened portion ~~(8)~~, the following steps are performed:

· defining a plane hairspring of constant strip section;

· determining the unbalance of said plane hairspring;

· determining a portion of the outer turn of said plane hairspring having the same unbalance as the plane hairspring; and

· varying the thickness ~~(e)~~, in the plane of the hairspring, of the strip forming the hairspring between an angle δ_1 and an angle δ_2 such that $\delta_1 < \beta_1$ and $\delta_2 > \beta_2$, where $\beta_2 - \beta_1$ is the angular extent of said portion of the outer turn, the thickness being caused to vary in accordance with a predetermined function f presenting a minimum substantially equal to the thickness ~~(e_0)~~ of the remainder of the strip at the angles δ_1 and δ_2, the function f and the angles δ_1 and δ_2 being selected so that the deformation of the turn portion delimited by the angles δ_1 and δ_2 is substantially the same as the deformation which would occur if the thickness of the strip between the angles δ_1 and β_1 and between the angles β_2 and δ_2 were the same as that of the remainder of the hairspring and if, between the angles β_1 and β_2, the stiffness of the outer turn were equal to a predetermined value, greater than that of the remainder of the strip.

17. (Currently Amended) The [[A]] method according to claim 16, wherein ~~characterized in that~~ said predetermined value is infinite.

18. (Currently Amended) The [[A]] method according to claim 16, wherein ~~or claim 17, characterized in that~~ the predetermined function f is convex and continuous.

19. (Currently Amended) The [[A]] method according to claim 13, wherein, ~~any one of claims 13 to 18, characterized in that~~ in order to determine a spacing ~~(d)~~ that is sufficient between the terminal portion of the outer turn ~~(7)~~ and the last-but-one turn ~~(9)~~, the following steps are implemented:

· defining a first point ~~(P_1)~~ on the radial axis passing through the outer end ~~(P_0)~~ of an initial plane hairspring having a stiffened portion ~~(8)~~, the first point ~~(P_1)~~ being situated beyond the last-but-one turn of said initial plane hairspring when said last-but-one turn is expanded by an amplitude corresponding to the maximum angle of rotation of the balance;

· defining a second point ~~(P_2)~~ on the outer turn;

· interconnecting the first and second points ~~(P_1, P_2)~~ by a circular arc ~~(18)~~ that is tangential to the outer turn at the second point ~~(P_2)~~;

· defining a third point ~~(P_3)~~ on the circular arc ~~(18)~~ between the first and second points ~~(P_1, P_2)~~, the third point ~~(P_3)~~ being such that the length of the segment of the circular arc ~~(18)~~ delimited by the second and third points ~~(P_2, P_3)~~ is equal to the length of the initial turn segment ~~(19)~~ delimited by the second point ~~(P_2)~~ and the initial outer end ~~(P_0)~~ of the hairspring; and

· giving a thickness in the plane of the hairspring to the circular arc ~~(18)~~ between the second and third points ~~(P_2, P_3)~~ that is identical to the thickness of the initial turn segment ~~(19)~~, the resulting turn segment between the second and third points ~~(P_2, P_3)~~ constituting a corrected terminal portion of the outer turn.

20. (Currently Amended) The [[A]] method according to claim 19, wherein ~~characterized in that~~ the second point ~~(P_2)~~ is situated at the end of the stiffened portion that is further from the outer end of the hairspring.

21. (Currently Amended) The [[A]] method according to claim 13, wherein, ~~any one of claims 13 to 18, characterized in that~~ in order to determine a spacing that is sufficient between the terminal portion of the outer turn ~~(7')~~ and the last-but-one turn ~~(9')~~, the following steps are implemented:

· defining a point on the outer turn in the stiffened portion;

· offsetting the terminal portion of the hairspring extending from said point radially outwards by giving the inner side of said terminal portion a circularly-arcuate shape the center of which is the geometrical center ~~(O)~~ of the hairspring and the outer side of said terminal portion a shape that gives said terminal portion a thickness in the plane of the hairspring that is identical to the thickness of the corresponding initial terminal portion of the outer turn; and

· connecting the terminal portion with the remainder of the stiffened portion by a connection portion that forms a double bend ~~(11)~~.

22. (Currently Amended) A method of making a regulating device having a balance and a plane hairspring for a time piece movement, ~~consisting in~~ comprising designing the regulating device in accordance with the method as defined in claim 13 ~~any one of claims 13 to 21~~, and then fabricating said regulating device.